PERINATAL SKELETAL INJURIES IN TWO BALAENOPTERID WHALES

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Two recently born balaenopterid whales (*Balaenoptera acutorostrata* and *Megaptera novaeangliae*) stranded on the coast of southern Queensland exhibited similar pericranial and rib lesions considered to result from compression injury. Birth trauma, perhaps associated with caudal presentation, is considered the most likely cause of the lesions. ☐ *Balaenopterid whales, skeletal injuries, birth trauma.*

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The Queensland Museum (QM) cetacean collection contains skeletal material of 11 juvenile balaenopterids of which 7 are minke whales *Balaenoptera acutorostrata*, 3 are humpback whales *Megaptera novaeangliae* and 1 a blue whale *B.musculus musculus*. Among these, pericranial and rib lesions are evident in 2 very immature specimens, 1 minke whale and 1 humpback whale. This paper describes the pathology and speculates on its cause.

DESCRIPTIONS

QMJM7301. A 2.9 m long ♀ minke whale stranded at the Big Sand Hill, Moreton Island (27°13'S, 153°22'E) on 11.vi.87. Its flipper and body colouration was typical of the diminutive or Type 3 form (Best, 1985) and was illustrated in Paterson (1994). The umbilicus was healed. Superficial 'cookie-cutter' lesions similar to those described in other examples of this species (Williamson, 1975; Arnold et al., 1987) were noted as

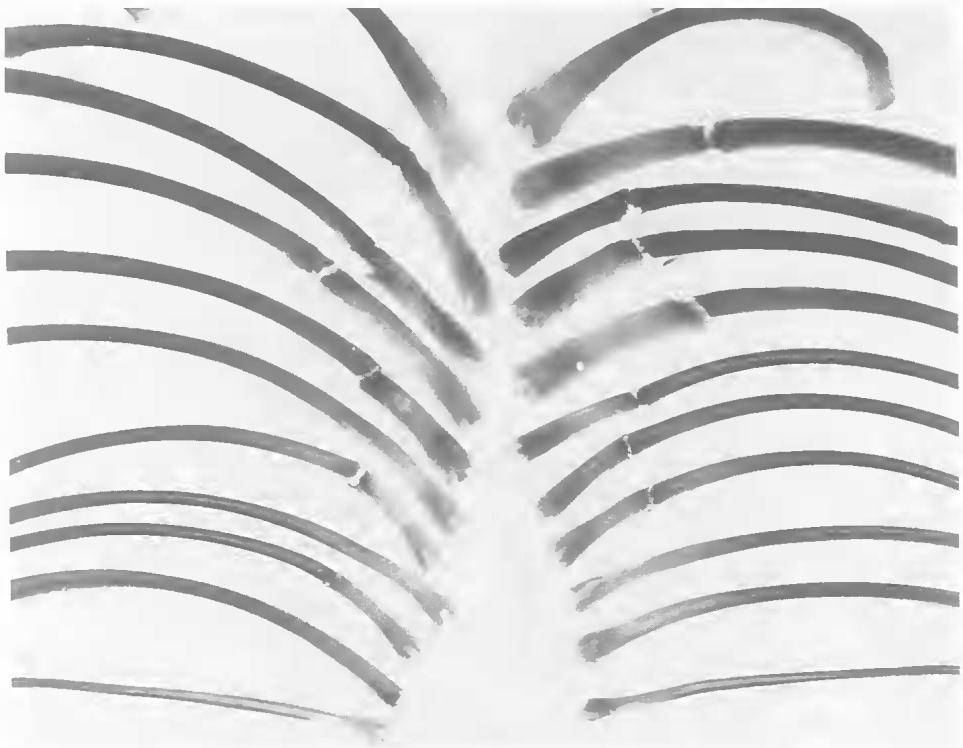

FIG. 1. Minke whale QMJM7301. Radiograph demonstrating numerous bilateral ventral rib fractures. The sternum has not been included.

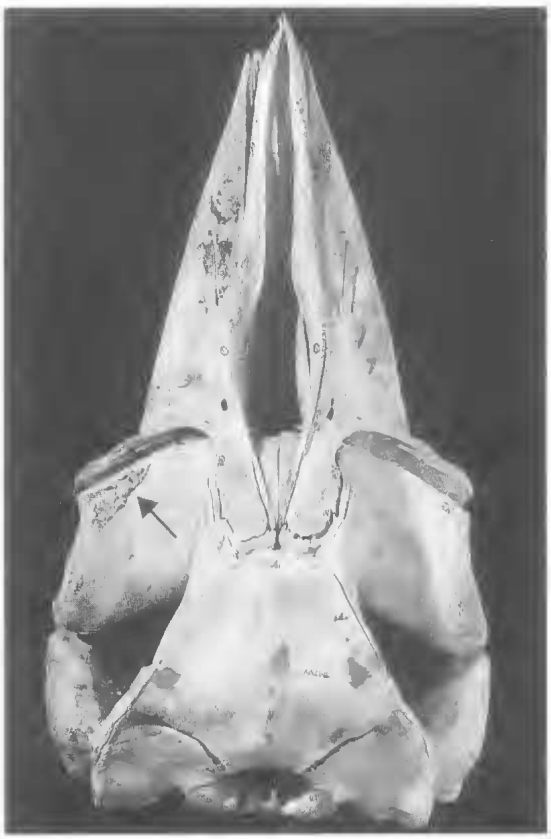

FIG. 2. Minke whale QMJM7301 (Left). Dorsal view of skull (98cm long) demonstrating periosteal new bone formation on the lateral aspect of the supra-orbital process of the left frontal bone. (Right) Close-up profile view of the same region.

well as predatory rakes near the dorsal fin. Bilateral rib fractures were palpable but there were no wounds or scars superficial to them. Abundant callus (some was lost during preparation) was evident both by direct inspection and radiological examination (Fig. 1). After preparation of the skull a raised area of shell-like ossification 6.0 cm long and 2.5 cm in greatest diameter was noted on the lateral aspect of the supra-orbital process of the left frontal (Fig. 2).

QM JM7303. A 4.2 m long ♂ humpback whale stranded at Moon Point, Fraser Island (25°14'S, 153°00'E) on 17.10.89. It was frozen soon after death and transported to the QM. The umbilicus was healed. Numerous bites and rakes, considered to be due to shark attack, were noted. They included a large fresh right axillary wound. Rib fractures (Fig. 3) were not as severe as those in QMJM7301. During dissection a cystic pericranial lesion measuring 16.0 cm long and 7.0 cm in greatest diameter was noted on the lateral aspect of the supra-orbital process of the right frontal (Fig. 4). There were no soft tissue or cutaneous abnormalities superficial to the lesion. Its raised periosteal edge was biopsied and histological examination (Fig. 5) demonstrated periosteal new bone formation superficial to a sub-periosteal cyst consistent with trauma several weeks prior to death (J. Musgrave pers.comm.).

DISCUSSION

There are very limited data concerning the time and place of birth of Type 3 minke whales. The two smallest examined in South Africa by Best (1985) were 1.92 m and 2.54 m long and they stranded at latitude 34°S in May and July respectively. The former had a raw and completely unhealed umbilicus and was considered to be a very recent live birth (Best, 1985). QMJM7301 was 2.9 m long, and stranding occurred at 27°S in June. Its skeleton was extremely immature compared with the 6 other juvenile minke whale skeletons in the QM collection and this suggests a very young age, probably less than 8 weeks.

There are extensive data concerning the time and place of birth of Southern Hemisphere humpback whales. The modal length at birth is 4.3 m (Chittleborough, 1958) and most births occur in the vicinity of latitude 20°S between late July and mid September (Townsend, 1935; Chittleborough, 1965; Paterson & Paterson, 1989).

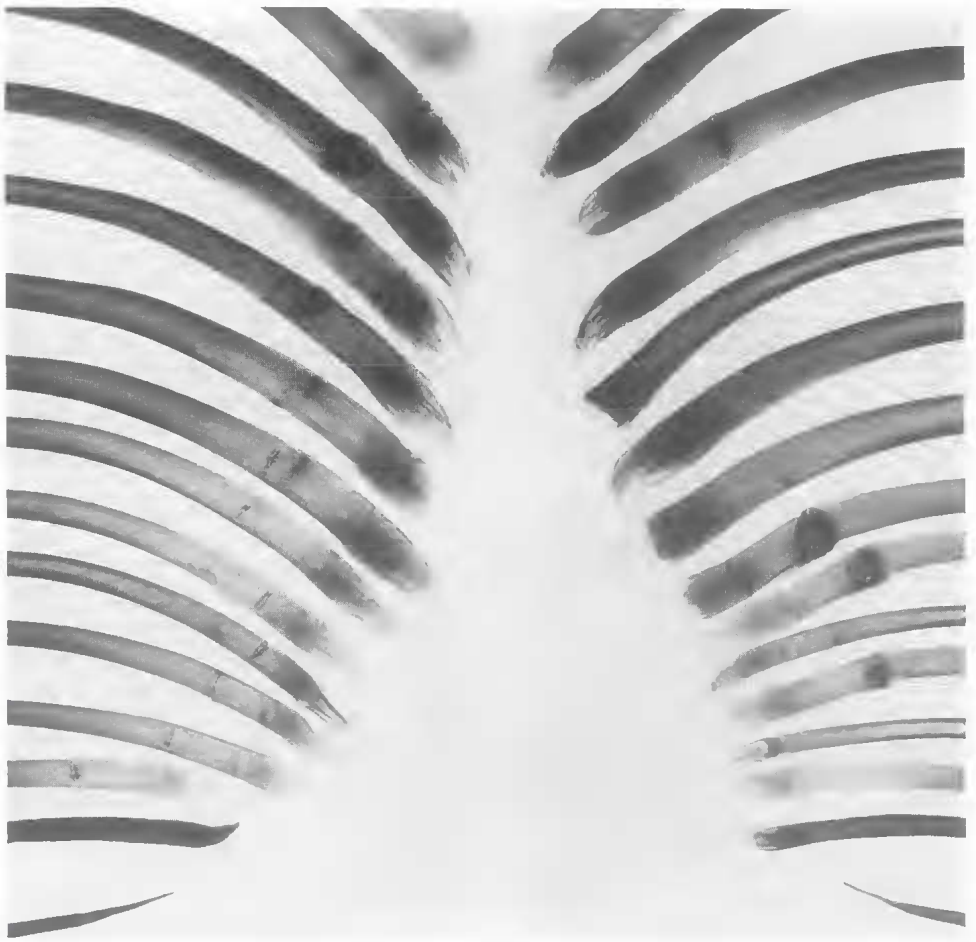

FIG. 3. Humpback whale QMJM7303. Radiograph demonstrating healing undisplaced bilateral ventral rib fractures. The sternum has not been included. (The vertical 'tracks' in some ribs on the left of the photograph result from drilling to insert numbering wires).

QMJM7303 was 4.2 m long and stranded at 25°S in October on the western side of Fraser Island, a region frequented by humpback whales during the southern migration (Corkeron et al., 1994). QMJM7303 was probably less than 6 weeks old when it died.

Radiological opinion was sought in an attempt to date the rib fractures. They were considered to have occurred approximately 6-8 weeks before death and were likely to have resulted from compression and not from blunt trauma (J.P. Masel, pers. comm.) The position and extent of the bilateral rib fractures are consistent with compression injury described in human neonates by Caffey (1973). The extensive fractures in QMJM7301 are considered to represent a 'central flail' a term used in human trauma when multiple rib fractures occur on both sides of the sternum (Hunt & Schwab, 1992). Such an injury in humans is often life-threatening and may require assisted ventilation. However, some healing was evident in the fractures of QMJM7301 and its death was not due to acute chest trauma.

The lateral aspect of the supra-orbital process of the frontal would be susceptible to injury, particularly in an immature animal, if dorsolateral compression occurred. Pericranial injury, similar to that in QMJM7301 and QMJM7303, occurs in c.2% of human neonates and is termed cephalhaematoma. It usually results from cranial moulding during parturition and, as an isolated finding, is not associated with mortality or persistent morbidity (Caffey, 1973). The degree of new bone formation in the pericranial lesion of QMJM7301 (Fig.2) suggests a longer period of survival than QMJM7303 in which new bone

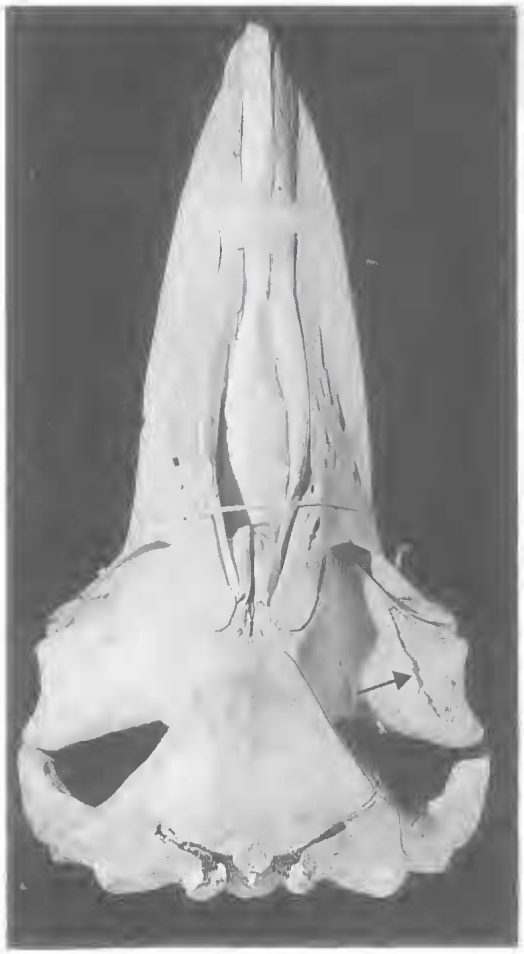

FIG. 4. Humpback whale QMJM7303. Dorsal view of skull (which measures 113cm in length) demonstrating periosteal new bone formation on the lateral aspect of the supra-orbital process of the right frontal bone.

formation was limited to the edge of the lesion (Fig. 4).

Most data concerning foetal presentation and the mechanism of parturition in cetaceans derive from studies of captive odontocetes. Caudal presentation is usual (McBride & Kritzler, 1951; Slijper, 1962), a presentation considered disadvantageous in large domestic animals. Arthur (1964) noted that in such animals the foetus is wedge-shaped when the presentation is cephalic and this serves to progressively dilate the birth canal during its passage, whereas in caudal presentation compression of the foetal abdomen causes expansion of the ribs and the costal arch engages abruptly. Also, the foetal occiput, often the broadest foetal part, makes an abrupt [pelvic] engagement. Caudal presentation has been noted in a humpback whale (Dunstan, 1957) and such presentation in mysticetes could be associated on occasions with the difficulties described by Arthur (1964), although the pelvic structures of cetaceans and large terrestrial animals differ considerably. Hartley (1983) listed contusions to the cranial periosteum and rib fractures among the postmortem findings in a large series of foal perinatal mortalities.

We conclude on the basis of available evidence that the pericranial and rib injuries in QMJM7301 and QMJM7303 were sustained during parturition. However, it remains conjectural if they contributed to the premature deaths of these whales.

ACKNOWLEDGEMENTS

We received valuable assistance from many persons. Patricia Paterson assisted with the dissection and retrieval of QMJM7301. Vic Hislop retrieved QMJM7303, arranged its freezing, and transported it to the QM. John Masel, Director of Metropolitan Paediatric Radiology in Brisbane, dated the rib fractures and John Musgrave of Sullivan, Nicolaides and Partners prepared and diagnosed the histological specimens from QMJM7303. Deidre Pyecroft gave us the benefit of her veterinary experience and searched the relevant literature. Bruce Cowell and Jeff Wright of the QM prepared the photographs. Sophie Kupis and Stephen Marmo, of the Jindalee Medical Centre and Royal Brisbane Hospital respectively, took the radiographs.

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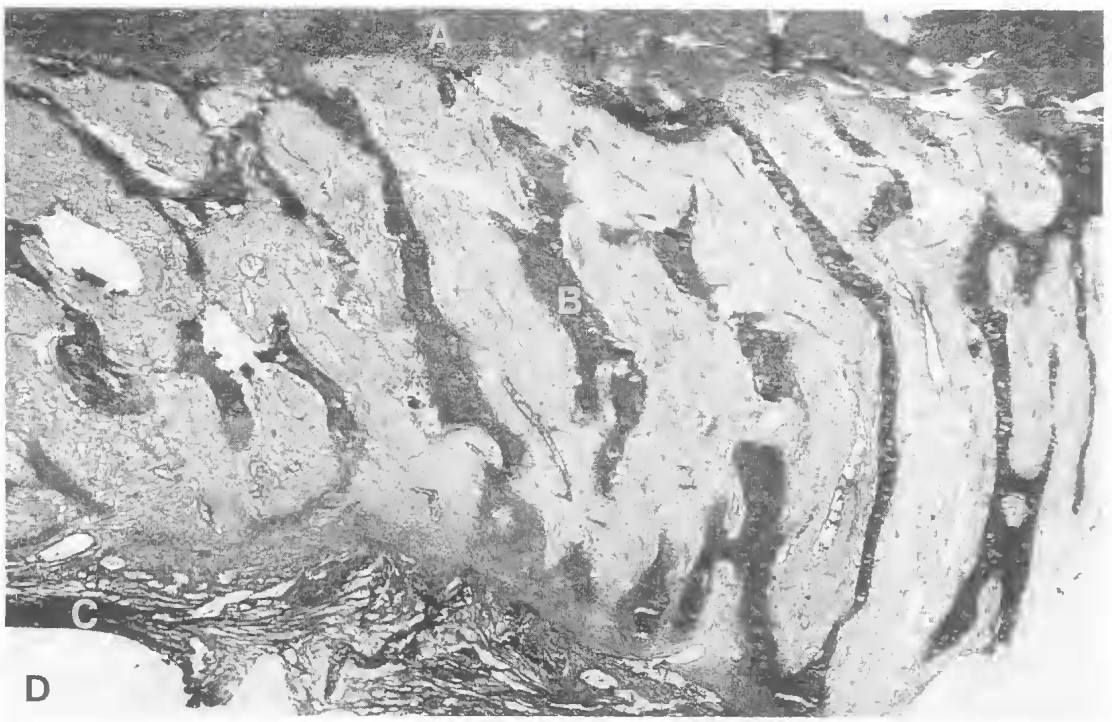

FIG. 5. Humpback whale QMJM7303. Histological section (x100) from edge of supra-orbital lesion demonstrated in Fig. 4. Thickened periosteum (A) is seen superiorly; spicules of vertically arranged osteoid seams (B) with intervening connective tissue are seen centrally and a layer of fibrous tissue (C) lines a sub-periosteal cyst (D) at the lower left of the photograph. The appearances are those of periosteal separation with some new bone formation superficial to a post-traumatic sub-periosteal cyst.

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